Gyanmanjari
Innovative University

Subject: Computer Oriented Numerical Method – BCAXX13206

Type of course: Multidisciplinary

Prerequisite: Probability and statistics, algebra, calculus etc.

Rationale: The basic concepts of Taylor's Series Method, Milne's Method, Lagrange's Method.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
4	0	0	4	100	30	00	00	70	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Sr. no.	Course content	Hrs	% Weightage
1	**Chapter – 1: Iterative Methods** Introduction, Bisection Method, Rate of Convergence, False Position or Regula Falsi Method, Order of Convergence of False Position or Regula Falsi Method, Newton Raphson Method, Convergence of Newton Raphson Method, Bairstow's Method	14	25%
2	**Chapter – 2: Solution of Simultaneous Linear Equations & Ordinary Differential Equations** Introduction, Gaussian Elimination Method, Partial and Full Pivoting (Ill – Conditions), Gauss – Seidel Iteration Method, Solution of a Differential equation, Taylor's Series Method, Euler's Method, Runge – Kutta Method: First Order, Second Order, Fourth Order Method, Predictor – Corrector Methods, Milne's Method	12	25%
3	**Chapter – 3: Interpolation** Introduction, Newton's Forward Interpolation Formula, Newton's Backward Interpolation Formula, Central Difference Interpolation Formulae: Gauss's Forward Interpolation Formula, Gauss's Backward Interpolation Formula, Stirling's Formula, Bessel's Formula	12	25%

4	**Chapter – 4: Numerical Differentiation & Integration** Introduction, Numerical Differentiation: Derivatives using Forward Difference Formula, Derivatives using Backward Differences Formula, Derivatives using Central Differences Formulae, Maxima and Minima of a Tabulated Function, Numerical Integration: Trapezoidal Rule, Simpson's one-third Rule, Simpson's three-eighth Rule	14	25%

Continuous Assessment:

Sr. No.	Active Learning Activities	Marks
1	**Case studies:** In your field, list the five real-world uses for statistics and numerical techniques. Then, explain how each challenge was solved.	10
2	**Preparation of Mind-Map:** The students have to prepare the mind map for probability and statistics using an A3 sheet and upload the same to the GMIU web portal.	10
3	**An interactive math tool:** Solve mathematical problems from the syllabus chapters with graphical visualization using any open-source interactive math tool and submit the solutions to the GMIU web portal.	10
4	**Vedic Mathematics** Students have to prepare a chart of short tricks utilizing Vedic mathematics for any three chapters, which will be submitted to the GMIU web portal.	10
5	**Chart:** Chart upon application of any topic of syllabus must be prepared by the students and upload to GMIU web portal.	10
6	**Preparation of Formulae List** Students have to list formulas with examples used in a given chapters and upload it to the GMIU web portal.	10
7	**Attendance**	10
	Total	**70**

Suggested Specification table with Marks (Theory): 100

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	40%	00	00	00

Note: This specification table shall be treated as a general guideline for students and teachers.
The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

	After learning the course, the students should be able to:
CO1	Comprehend various number systems such as binary, octal, decimal, and hexadecimal.
CO2	Write efficient and robust code to solve linear systems and other problems using iterative techniques.
CO3	Understanding the application of simultaneous linear equations in various scientific and engineering problems, such as circuit analysis, structural analysis, and optimization.
CO4	Develop a solid understanding of interpolation as a numerical technique used to estimate values between known data points

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] Numerical Method For Engineering-by Steven C.Chapra and Raymond P.Canale.

[2] Numerical Methematics and Computing by Ward cheney and Devid Kincaid.

[3] Applied Numerical Linear Algebra By James W.Demmel.